



RHODE ISLAND DEPARTMENT OF HEALTH



**2011**

# INTRODUCTION

The U.S. Environmental Protection Agency (EPA) was created in 1970 to protect human health and the natural environment. In 1974, Congress passed the Safe Drinking Water Act in response to growing concerns over contamination of water supplies by agricultural and industrial chemicals.

Major amendments to the Act were added in 1986 and 1996 that expanded the number of regulated contaminants, required cost-benefit analyses for future standards, supported public right-to-know, provided small water system support, and created loan funding programs for water infrastructure projects.

Current drinking water standards are the culmination of many years of industry regulatory oversight:

The Interstate Quarantine Act of 1893

- Intended to prevent the spread of disease
- Applied only to systems providing water to interstate travel (boats & trains)
- Enforced By United States Public Health Services (USPHS)

United States Environmental Protection Agency (US EPA) was established in 1970.

- 1974 - Safe Drinking Water Act (SDWA) enacted
- 1996 – Most recent amendments to the SDWA

*Copies of this document are also available upon request in braille, large print, audiocassette, and as an electronic file on a computer disk. Contact the Rhode Island Department of Health, Office of Drinking Water Quality, Three Capitol Hill, Providence, RI 02908. Phone number: 401-222-6867, or Relay RI (TDD) at 711.*

## FROM OUR CHIEF

Access to safe drinking water is essential to health and a vital component of effective policy for public health protection. The tools we use to support the safe management of this necessary resource are many and varied, since we work with both the state's large treatment facilities and the smallest community suppliers.

Whatever the size the water system, our goal is always the same - achieving the safest drinking water supply possible.



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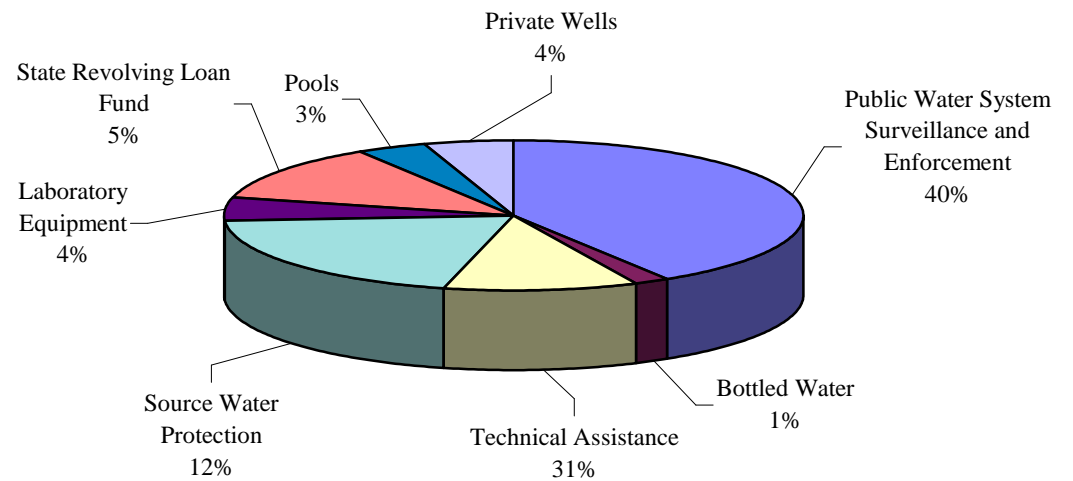
# FINANCIALS

## Program Budget

The average budget for this office during this period:

Federal Funding	\$ 3,493,000
State Funding	438,000
Restricted Receipt	<u>82,000</u>
Total Budget	\$4,013,000

## Programs / Initiatives Supported by Funds



# CHAPTER 1

## IMPACT AND OVERSIGHT



# PUBLIC DRINKING WATER

The mission of the Public Drinking Water Program is to protect and promote the health and safety of the people of Rhode Island by ensuring the quality of the state's public drinking water supplies for use by Rhode Island residences, businesses, hospitals, nursing homes, schools, restaurants, industry, and fire and emergency response. The Office of Drinking Water Quality works hard to maintain an excellent record of meeting this high priority public health responsibility.

## HEALTH's Role

- Enforce federal and state drinking water regulations
- License and regulate public water systems
- Certify drinking water operators
- Inspect public water systems
- Sample and monitor water quality
- Training
- Administer the Drinking Water State Revolving Loan Fund
- Plan for emergencies, security, and counterterrorism
- Source water assessment
- Engineering reviews
- Capacity development

Persons served by public water in Rhode Island	*1,092,268
Persons served by surface water systems	*868,329
Persons served by groundwater systems	*223,939
Public water systems	487
Community systems	88
Non-transient systems	79
Transient systems	320
Systems using surface water	28
Systems using groundwater	**459

\*Includes all populations, transient, residential, and workplace.

\*\*Some water systems use both ground and surface water (purchased and non-purchased).

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**P**ublic water systems in Rhode Island range in size from large city systems that serve nearly 300,000 residents to small, rural, non-community transient systems, such as restaurants or convenience stores that utilize wells as their drinking water source.

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## TYPES OF PUBLIC WATER SYSTEMS

A **public water system** provides piped water to the public for human consumption. A public system has at least 15 service connections or regularly serves an average of 25 individuals daily for at least 60 days out of the year.

**Community** water systems serve at least 25 year-round residents, or have at least 15 service connections used by year-round residents.

**Non-transient non-community** water systems serve at least 25 of *THE SAME* people, for at least six months of the year. Schools and factories are examples.

**Transient non-community** water systems serve at least 25 *DIFFERENT* people for at least 60 days of the year. Restaurants, hotels and campgrounds are transient water suppliers.

# PRIVATE DRINKING WATER

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**T**he Private Well Program is 100% federally funded and is the only source of public health information for more than 100,000 citizens and tourists who rely on private water systems for their drinking water. This program is critical to assuring safe and potable water supplies through the education of private well owners, state and local officials, and other involved parties on the proper construction, maintenance, operation, and testing of their wells.

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Within HEALTH, the Office of Private Well Water Contamination ensures that required well testing is carried out per regulation and that the well-owning public is educated as to what testing is recommended for routine maintenance of their wells. HEALTH has partnered with the University of Rhode Island Cooperative Extension Water Quality Program since 1993 to promote local protection of public drinking water sources and private wells.

## 2011 PROGRAM HIGHLIGHTS

Provided educational programs and resources to municipal officials and private well owners to protect and maintain drinking water sources

Worked with towns that rely on local groundwater for drinking water or have major surface water supply reservoirs to draft model procedures for evaluation of effects of groundwater withdrawals in project review

Development of web database of local ordinances for source water protection

Produced a technical guide to monitoring the depth and duration of the seasonal high water table in Rhode Island

# PUBLIC POOLS AND SPAS

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**A**ssures public health and safety of public pools and spas through licensing, design approval, inspection, sampling, and complaint response.

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HEALTH ensures that public swimming pools are constructed and operated in a safe and sanitary manner. Inspections of the filtering system, water quality, and other sanitary and safety concerns are performed routinely.

In 2011 HEALTH licensed 408 public pools. Yearly (indoor) pools are licensed to operate from January 1 through December 31 of the year issued. Seasonal (outdoor) pools are licensed from June 1 through September 30 of the year issued. Compliance data for the Public Pools and Spas Program is included in Appendix - III (page 41).

Licensed Public Pools 2011			
Swimming Pools		Therapy Pools (Hot Tubs)	
Yearly	Seasonal	Yearly	Seasonal
115	214	66	13
Total licensed public pools 408			

# BOTTLED WATER

## HEALTH's Role

- Licensure of both in and out of state operations
- Inspections
- Water quality sampling
- Water quality data review
- Source approval for in-state operations
- Response to water quality/health issues

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**T**his program assures public health and safety of bottled drinking water through licensing, approvals inspections, sampling, and complaint response. Risks to the general public caused by bottled water can include contracting waterborne illness due to poor source water quality, treatment, or bottling processes. HEALTH oversight greatly reduces these risks.

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Bottled water is an increasingly popular beverage. More than 8.5 billion gallons are sold annually in the United States. The U.S. Food and Drug Administration (FDA) regulate bottled water as a food product. Under the Federal Food, Drug, and Cosmetic Act (FFDCA), manufacturers are responsible for producing safe, wholesome and truthfully labeled food products, including bottled water products. The FDA has established specific regulations for bottled water including standard of identity regulations that define bottled water as “water that is intended for human consumption and that is sealed in bottles or other containers with no added ingredients except that it may optionally contain safe and suitable antimicrobial agents”.

Bottled water may come from several sources: artesian well water, public water systems, mineral water, purified water, sparkling water, or spring water. Prerequisites for obtaining a bottling permit are: submittal and approval of analytical data for the water source and product, label approval, satisfactory inspection reports, and approval of the permit application. Compliance data for the bottled water program is included in Appendix - IV (page 42).

# CHAPTER 2

## OUTREACH AND COLLABORATION



# CAPACITY DEVELOPMENT

**T**he 1996 amendments to the Safe Drinking Water Act (SDWA) include provisions for capacity development. The EPA, states, and public water systems work together to ensure that public water systems attain and maintain the technical, managerial, and financial capacities that contribute to the viability of sustainable water utilities.

## DEVELOPING CAPACITY

Rhode Island's public drinking water systems face a wide array of challenges in meeting the public health protection standards aimed at ensuring safe drinking water.

The state's capacity development strategy identifies water systems that have inadequate technical, managerial, and financial capacity. Once identified, our focus is on developing and implementing strategies that provide system personnel with the tools and knowledge that effectively improve personnel capacities increasing the system's potential for sustainability

HEALTH maintains various contracts with industry professionals and organizations to provide wide-ranging services to the owners and operators of public water systems. In 2011, HEALTH partnered with the Atlantic States Rural Water and Wastewater Association, New England Water Works Association, The University of Rhode Island Cooperative Extension, Horsley Witten Group, and The Louis Berger Group, Inc.

### 2011 Highlights

- Technical assistance and one-on-one consultant program for small water systems serving populations of 3,300 or less
- Production of small system facility improvement plans
- Water system management guides

# OPERATOR CERTIFICATION

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Ensuring a competent workforce is a key element in the protection of public health and the provision of safe drinking water. Individuals who operate public water supply treatment and distribution systems must be certified and licensed by HEALTH. Once licensed, operators adhere to continuing education and experience requirements prior to license renewal or upgrade. In 2011 there were 600 licensed and certified treatment and distribution operators holding 711 certifications.

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## CERTIFICATION & TRAINING

There are 169 Rhode Island public water systems that are required to comply with the state's operator certification regulations. A Board of seven persons comprised of the Director of HEALTH, (or his designee) and six members appointed by the Governor oversee the program. The Board meets quarterly and is responsible for review and/or updates to the regulations [R23-65-DWQ]; reviewing and approving applications for certification exams and license renewal; and disciplinary actions against licensees as necessary.

In collaboration with the Capacity Development, Drinking Water State Revolving Loan Fund, and Emergency Planning programs, the Operator Certification program offered operators a variety of training and professional development opportunities in 2011. Together we offered:

- Individual and group training and operator certification assistance for the state's 600 certified operators, and
- A training course voucher program through New England Water Works Association.

# EMERGENCY PLANNING AND SECURITY

A secure water sector is critical to protecting public health and ensuring public confidence. Through this office, HEALTH's Water System Security and Emergency Preparedness Program is responsible for helping drinking water systems develop plans to better respond to potential disasters or emergencies.

## SAFETY & SECURITY

Public water and power sectors share many of the same vulnerabilities, such as natural and manmade disasters, pandemics, and terrorism. However, water distribution networks are more resistant to the effects of weather. During severe storms or other events resulting in a loss of power, water systems may need to rely on auxiliary power units to maintain critical operations for several days or weeks.

HEALTH completed a public water system backup generator survey. The survey results provide an extensive review of the backup power generation capabilities of the drinking water facilities in the state.

This project provides the support needed at the state level to ensure an uninterrupted supply of potable water for our citizens during emergencies, disasters, and other natural or manmade crises.

Project outcomes will be used to determine the need for modifications to the *Rules and Regulations Pertaining to Public Drinking Water [R46-13-DWQ]*.

Also during 2011, HEALTH sponsored:

- Four tabletop exercises which focused on strengthening partnerships, program development, and response protocols among utility and “typical” first responders e.g., fire, police, EMS, 911 dispatchers, and county emergency management), and
- Incident Command System and National Incident Management System training refreshers to public water systems.

# DRINKING WATER STATE REVOLVING LOAN FUND

The Safe Drinking Water Act Amendments of 1996 authorized the creation of a Drinking Water State Revolving Loan Fund (DWSRF) program to help public water systems finance the costs of infrastructure needed to achieve and/or maintain compliance with SDWA requirements and to meet the public health objectives of the act.

## IMPROVING SUSTAINABILITY

Our office, in conjunction with the Rhode Island Clean Water Finance Agency (RICWFA), operates the DWSRF program with funds awarded through an annual EPA capitalization grant. Among the many program functions, staff is responsible for compilation of an infrastructure project priority list; environmental review of proposed projects; oversight of construction; and loan payment review. Capacity development and operator certification are key loan program qualification components and are reviewed during the application process.

During the state fiscal year 2011, (July 1, 2010 – June 30, 2011) three new loans were made under the DWSRF base program.

The FY11 Program Evaluation Report completed by EPA determined that the State is in compliance with regular program requirements and has made a total of 43 loan agreements for drinking water infrastructure projects from the DWSRF program as of June 30, 2011. These loans which totaled \$218,705,811, were made from a combination of base DWSRF funds and funds from the American Recovery and Reinvestment Act (ARRA) and far exceeded the required level of binding commitments of \$94,857,575.



# **CHAPTER 3**

## **PROTECTING FROM CONTAMINANTS**



# WATER QUALITY MONITORING & TREATMENT

There are many sources for water pollution. Contamination of drinking water can occur at multiple points, including in the water source, through inadequate water treatment processes, in storage tanks, and in distribution systems (the pipes that carry water to homes, businesses, schools, and other buildings). Treating water to remove or kill disease-causing contaminants is critical to the protection of public health.

## MAXIMUM CONTAMINANT LEVELS

Under the Safe Drinking Water Act (SDWA), EPA sets maximum legal limits on the levels of certain contaminants in drinking water (MCL). The legal limits reflect both the level that protects human health and the level that water systems can achieve using the best available technology.

EPA rules also set treatment requirements, water-testing schedules and methods that water systems must follow.

HEALTH is the agency responsible for ensuring that the water systems in Rhode Island comply with these rules. Compliance Data for 2011 is included in Appendix-II (page 29).

## CHEMICAL CONTAMINANT RULES

Chemical Contaminants were regulated in phases, which are collectively referred to as the Chemical Phase Rules. HEALTH regulates more than 90 contaminants in three contaminant groups: Inorganic Contaminants (IOCs), Volatile Organic Contaminants (VOCs), and Synthetic Organic Contaminants (SOCs). A list of contaminants and their maximum contaminant levels (MCLs), is maintained on line at <http://water.epa.gov/drink/contaminants/index.cfm>. The rules apply to all public water systems (PWS). PWS type, size, and water source determine which contaminants require monitoring for that system.

### Radionuclides

Most drinking water sources have very low levels of radioactive contaminants ("radionuclides"), most of which are naturally occurring, although contamination of drinking water sources from human-made nuclear materials can also occur.

# WATER QUALITY MONITORING & TREATMENT

## **Arsenic**

Arsenic is a semi-metal element in the periodic table. It is odorless and tasteless. It enters drinking water supplies from natural deposits in the earth or from agricultural and industrial practices.

## **Total Coliform**

There are a variety of bacteria, parasites, and viruses which can cause health problems when humans ingest them in drinking water. Testing water for each of these germs would be difficult and expensive. Instead, water quality and public health workers measure for the presence of bacteria in drinking water using coliform bacteria as an indicator. The presence of any coliforms in drinking water suggests that there may be disease-causing agents in the water.

## **Disinfectants and Disinfection Byproducts (DBPs)**

In many cases, source water from a lake, river, reservoir or ground water aquifer is disinfected to inactivate (or kill) microbial pathogens. A major challenge for water suppliers is how to balance the risks from microbial pathogens and disinfection byproducts. In 2011 there were 28 water systems regulated by this rule. There were also 18 systems that purchase and distribute water that has been treated with a disinfectant. These systems currently monitor the residual chlorine levels throughout their distribution systems. Beginning in 2012 they will also monitor levels of DBPs.

## **TREATMENT RULES**

### **Ground Water Rule**

The purpose of the rule is to reduce disease incidence associated with disease-causing microorganisms in drinking water. The rule establishes a risk-based approach to target ground water systems that are vulnerable to fecal contamination. Ground water systems that are identified as being at risk of fecal contamination must take corrective action to reduce potential illness from exposure to microbial pathogens. The rule applies to all systems that use ground water as a source of drinking water.

# WATER QUALITY MONITORING & TREATMENT

## **Surface Water Treatment Rules (SWTR)**

These rules establish filtration and disinfection treatment requirements for the control of pathogens for all public water supplies that utilize surface water sources or ground water sources that are under the influence of surface water. In Rhode Island there are 10 water systems that are covered by these rules. All of these water systems provide filtration and disinfection as part of their treatment processes. The SWTR requires an additional 22 systems that are secondary sellers of surface water to maintain a chlorine residual throughout their distribution system.

## **Lead & Copper Rule**

The Lead and Copper Rule is intended to minimize the corrosivity of water provided by community and non-transient non-community water systems. Lead and copper enter drinking water primarily through plumbing materials. The treatment technique requires systems to monitor drinking water at customer taps. Excessively corrosive water triggers a requirement for a treatment proposal, public education, and if applicable, lead service line replacement.

Thirteen water systems are currently exceeding either the lead or copper action level. Of these, two systems have connected to neighboring municipal suppliers, and one is re-plumbing to remove lead and copper. Four systems have been successful in reducing lead and copper. Two are proposing treatment, while five are adjusting (or have already adjusted) existing treatment.

Providence Water has been exceeding the lead action level since 2006, and has since been working to adjust its water chemistry to reduce corrosion. Lead service line replacement has been halted in the distribution system pending possible changes to the US EPA Lead and Copper Rule; meanwhile, an expert panel has been convened to study the corrosion control situation in Providence.

# WATER QUALITY SAMPLING AND TESTING

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ater quality sampling and testing not only ensures that each system complies with required monitoring, but more importantly, ensures the quality of the state's drinking water.

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HEALTH's laboratory continues to take an active role in assisting water systems with required water quality testing. During 2011, HEALTH's laboratory analyzed 5,577 samples. The Office of DWQ evaluated approximately 80,000 samples.

HEALTH is preparing to accept water quality data from certified environmental laboratories on behalf of public water suppliers. The E2 web-based system will provide an alternative to submitting handwritten or paper-based reports. All of the necessary legal, security, and electronic signature functions will be included to provide for completely paperless reporting.

A broad spectrum of environmental tests and analyses are provided to public water systems.

## HEALTH'S Role

- Test drinking water from Rhode Island public water systems for organic and inorganic contaminants, minerals, and trace metals to determine safety and compliance with the Safe Drinking Water Act
- Test potability of water from private wells
- Analyze water samples in support of special pollution monitoring programs
- Maintain analytical instrumentation to detect and measure the concentration of a variety of pesticides, volatile and synthetic organic pollutants in drinking water
- Ensure the high quality of testing services
- Operate the analytical laboratory certification program
- Maintain a list of laboratories certified for the analysis of drinking water, non-potable water and environmental lead

# CHAPTER 4

## PERFORMANCE AND COMPLIANCE



# INSPECTIONS AND SITE VISITS

All aspects of a public water system (water source, treatment facility, operation and maintenance) need periodic inspection to assure that the water system continues to supply safe drinking water to the public.

## WATER SYSTEM INSPECTIONS

During 2011, HEALTH's, DWQ staff conducted sanitary survey inspections as listed in the detailed chart provided. Follow-up sanitary survey inspections were required at a majority of these facilities to ensure that any deficiencies had been satisfactorily addressed. Additional inspections were conducted in direct response to requests for technical assistance from water systems. Survey personnel also performed compliance inspections of new construction or significant improvements in water system infrastructure.

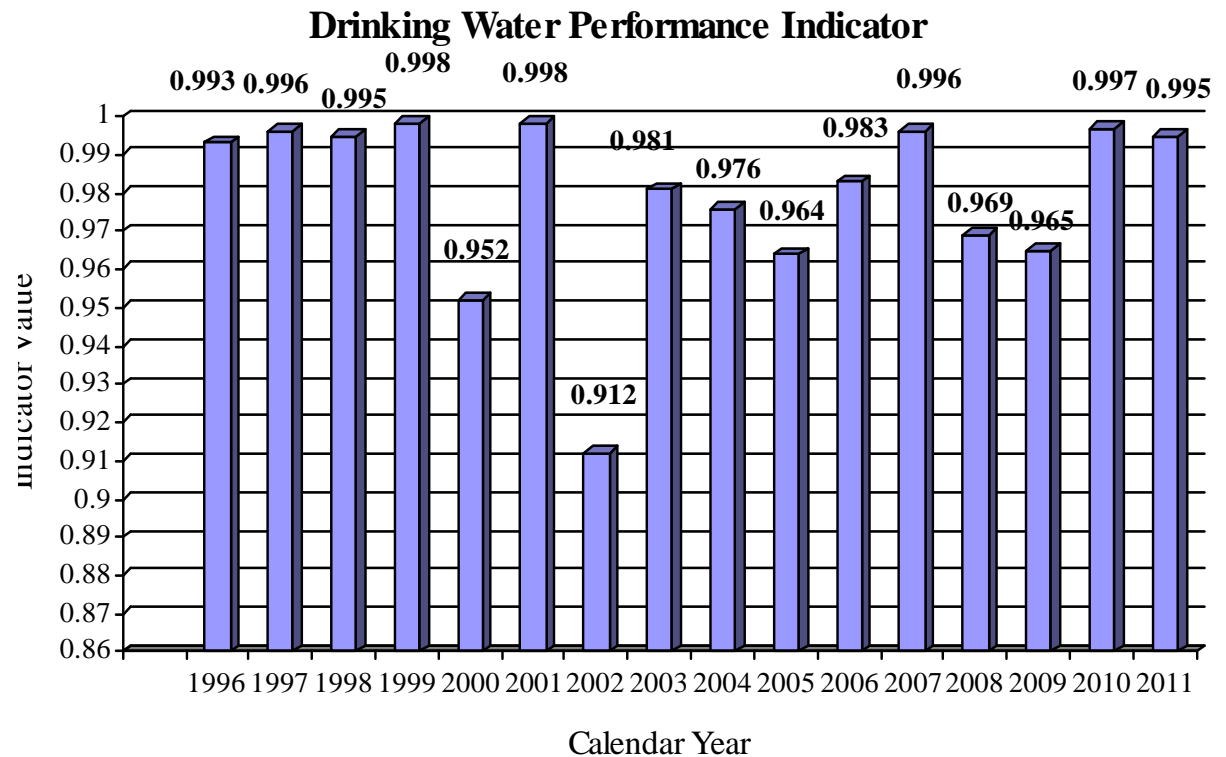
Water System Inspections	2011
Total number of Water systems inspected	121
Total population served	359,511
Number of community systems inspected	34
Population served	347,390
Number of transient Non-community systems Inspected	80
Population Served	11,204
Number of Non-transient, non-community systems inspected	7
Population Served	917

# PERFORMANCE REVIEW

Of all the requirements with which water systems are expected to comply, the most important is that of meeting minimum health standards. Each year, HEALTH evaluates the progress of the State's individual water systems as well as Rhode Island's Drinking Water Program in meeting these minimum health standards.

## PERFORMANCE REVIEW

The performance of the State's public drinking water systems during 2011, based on compliance with water quality criteria requirements in the Safe Drinking Water Act, is evaluated and compared to previous years. This evaluation is assessed using a "performance indicator" value. This value, shown in the chart to the right, is determined by calculating the days each water system is in compliance with all maximum contaminant levels (MCLs) and treatment techniques, and the population the system serves, and comparing this to the number of days the system is serving that population. An indicator value of 1.0 would indicate that all public water systems were in compliance with MCL and treatment technique requirements for the entire year.



$$\text{Indicator Value} = \frac{\sum (\text{PWS Population Served}) \times (\text{Days in Compliance With MCLs and Treatment Technique Requirements})}{\sum (\text{PWS Population Served}) \times (\text{Total Days in Operation})}$$

# PERFORMANCE REVIEW

## COMPLIANCE

The 2011 Annual Compliance Report summary table, as required by the Safe Drinking Water Act amendments of 1996, can be found in Appendix 2 (pages 30-41)

During calendar year 2011, 200 violations of the Safe Drinking Water Act were reported by 110 of the State's public water systems. Of these 200 violations, 92 were water quality violations, 98 were monitoring violations, 3 were treatment technique violations, 2 were failure to report optimized corrosion control treatment, 3 were consumer confidence report (annual report) violations, 1 was failure to perform public notification, and 1 was for failure to employ a licensed operator. A summary of the violations is presented in Appendix 1 (page 24).

### Quality Violations

Quality violations occur when monitoring results for a particular contaminant exceed the drinking water standard within a specific time period. Public water systems must monitor for 90 contaminants including inorganic compounds, volatile organic compounds, synthetic organic compounds, radionuclides, and pathogens. During 2011, fifty-one public systems exceeded a drinking water standard for a total of 92 violations. Of those 92 violations, 90 were bacteriological violations and 2 were for nitrate.

### Monitoring Violations

Monitoring and reporting violations occur when a water system fails to perform the required monitoring for a particular contaminant within a required time period, and/or fails to report the results by the tenth day of the following month, as required. During 2011, sixty-nine of the state's water systems failed to perform the required monitoring and/or reporting within the required time period. In all, 92 monitoring and reporting violations were reported.

### Public Notification violations

Public Notification violations occur when a water system fails to provide timely and complete public notices to their customers in the event of public drinking water violations or situations that may pose a risk to public health. There was 1 public notification violation issued in 2011.

### Treatment Technique Violations

Treatment Technique violations occur when a water system fails to comply with the required treatment of its water. During 2011, three of the state's water systems failed to maintain proper treatment and 2 failed to submit optimal corrosion control reports as required.

### Consumer Confidence report Violations

Consumer confidence report violations occur whenever a community public water system fails to provide a Consumer Confidence Report (CCR) to their consumers by July 1 of each calendar year, and/or fails to certify delivery to HEALTH by October 1 each year. During 2011, three public water systems received consumer confidence report violations.

### Operator Violations

Community public water systems are required to employ appropriately certified facility operators who have been licensed by HEALTH. During 2011, one water system received an operator violation.

# COMMUNITY WATER SYSTEMS

## APPENDIX I

## VIOLATIONS 2011

## NUMBER OF VIOLATIONS

<b>Quality:</b>	
CANONCHET CLIFFS WATER ASSOCIATION INC. (TCR)	3
JOHNSTON WATER CTRL FAC. - WEST END (TCR)	1
LAUREL CREST_GLOCESTER HOUSING AUTHORITY (TCR)	4
LINDHBROOK WATER COMPANY (TCR)	1
PRUDENCE ISLAND WATER DISTRICT (TCR)	1
QUONOCHONTAUG EAST BEACH WATER ASSOCIATION (TCR)	1
RICHMOND WATER SUPPLY BOARD (TCR)	1
THE VILLAGE ON CHOPMIST HILL (TCR)	1
<b>Monitoring and Reporting:</b>	
CHIMERA INC (VOC)	2
GREENVILLE WATER DISTRICT (TCR)	1
HEMLOCK VILLAGE (PB&CU)	1
KENT COUNTY WATER AUTHORITY (DEHP)	1
KENT COUNTY WATER AUTHORITY (NO3)	1
LAWRENCE SUNSET COVE ASSOCIATION (TCR)	2
LAWRENCE SUNSET COVE ASSOCIATION (VOC)	1
PAWTUCKET-CITY OF (TCR)	1
QUONOCHONTAUG EAST BEACH WATER ASSOCIATION (TCR)	3
QUONOCHONTAUG EAST BEACH WATER ASSOCIATION (GWR)	1
RICHMOND WATER SUPPLY BOARD (GWR)	1
SHANNOCK WATER DISTRICT (TCR)	1
<b>Consumer Confidence Report:</b>	
UNITED WATER RHODE ISLAND	1
WARWICK-CITY OF	1
WARWICK-POTOWOMUT	1
<b>Treatment Technique</b>	
PASCOAG UTILITY DISTRICT, WATER DIVISION (TT)	1
<b>Operator</b>	
EAST PROVIDENCE-CITY OF	1
COMMUNITY WATER SYSTEM SUBTOTAL	34

# NON-COMMUNITY NON-TRANSIENT WATER SYSTEMS

## VIOLATIONS 2011

	NUMBER OF VIOLATIONS
<b>Quality:</b>	
LAKEVIEW / CHARLESTOWN EARLY LRNING CTR. (TCR)	3
METCALF ELEMENTARY SCHOOL (TCR)	1
QUONSET BUSINESS PARK (TCR)	1
SILVEIRA KINDERGARTEN AND NURSERY (NO3)	1
<b>Monitoring and Reporting:</b>	
ARCADIA CHILDRENS HOME (PB&CU)	1
CHARLESTOWN POLICE STATION (VOC)	1
CHARLESTOWN POLICE STATION (SOC)	1
DR. DAYCARE CHILD DEVELOPMENT CENTER (TCR)	1
DR. DAYCARE CHILD DEVELOPMENT CENTER (PB&CU)	1
FACTORY MUTUAL (TCR)	1
FOGARTY MEMORIAL SCHOOL (PB&CU OCCT)	1
LAKEVIEW/CHARLESTOWN EARLY LEARNING CENTER (TCR)	1
LAKEVIEW/CHARLESTOWN EARLY LEARNING CENTER (GWR)	1
PONAGANSETT HIGH SCHOOL (PB&CU)	1
QUONSET BUSINESS PARK (TCR)	1
RICHMOND SCHOOL (PB&CU OCCT)	1
<b>Treatment Technique</b>	
NORTH SCITUATE ELEMENTARY	1
NON-COMMUNITY NON-TRANSIENT WATER SYSTEM SUBTOTAL	19

## VIOLATIONS 2011

Quality:	NUMBER OF VIOLATIONS
ARROWHEAD DENTAL ASSOCIATES, INC. (TCR)	1
BEAVER RIVER GOLF CLUB, INC. (TCR)	1
BLACKIES BULLDOG TAVERN(TCR)	3
BRICK OVEN RESTAURANT, THE, INC. (TCR)	3
BRIGGS BEACH, INC. (TCR)	1
BURLINGAME RESERVATION-MAIN CAMP-LEGIONT (TCR)	4
CAMP RUSSELL (CANOE HOUSE WELL), MALLARD(TCR)	2
CAMP WATCHAUG (TCR)	1
CHESTERS INC (TCR)	1
COMMONS LUNCH, INC. (TCR)	2
COVENTRY MENS CLUB, INC. (TCR)	2
EPISCOPAL CONFERENCE CENTER-GIRLS AREA (TCR)	1
EUREKA HOTEL CORP., INC. (TCR)	1
EXETER PUBLIC LIBRARY (TCR)	2
FAMOUS PIZZA(TCR)	3
FANTASTIC UMBRELLA FACTORY (NO3)	1
HICKORY RIDGE CAMPGROUND (TCR)	2
HOG ISLAND WATER ASSOCIATION-SOUTH END (TCR)	1
K & S PIZZA(TCR)	2
LUCKY HOUSE LLC (TCR)	2
NORDIC LODGE (TCR)	1
NORTH SCITUATE PUBLIC LIBRARY(TCR)	1
OAK EMBERS CAMPGROUND (TCR)	1
PAYNES NEW HARBOR DOCK(TCR)	2
PLAZA AT PARK SQUARE (TCR)	3
POWDER MILL CREAMERY, LLC (TCR)	1
RI SPORTS CENTER, INC. (TCR)	5
RIS ONLY 24 HR. TRUCK/AUTO PLAZA INC. (TCR)	3
SACHUEST POINT NATL WILDLIFE REFUGE (TCR)	2

## VIOLATIONS 2011

NUMBER OF  
VIOLATIONS

SAKONNET GOLF CLUB (TCR)	2
SCHARTNER CORNER NURSERY (TCR)	1
SEAVIEW MOTOR COURT(TCR)	1
SIZZLER'S BAR & GRILLE (TCR)	2
SLATERSVILLE PHARMACY COMPLEX (TCR)	1
STEPPING STONE STABLES, INC. (TCR)	1
TOWNSMEN CLUB, INC. (TCR)	3
W. ALTON JONES CAMPUS - ENVIRONMENTAL EDUCATIONAL CENTER (TCR)	1
W. ALTON JONES CAMPUS - URI POOR FARM (TCR)	3
WINDMILL HILL GOLF COURSE, INC. (TCR)	3
<b>Monitoring and Reporting:</b>	
AMERICAN LEGION-GORDON GREENE POST #27 (TCR)	1
ANN & HOPE WATER VENDING DBA SUNNY SPRING, CUMBERLAND (TCR)	2
ANN & HOPE WATER VENDING, DBA SUNNY SPRING WARWICK (TCR)	2
BEAVER RIVER GOLF CLUB, INC. (TCR)	1
BLACKIES BULLDOG TAVERN (GWR)	1
BLOCK ISLAND RESORTS-MANISSES (TCR)	1
BOWDISH LAKE CAMPING AREA (TCR)	1
BURLINGAME PARK-PROSSER BEACH (TCR)	1
CAMP AYOHO, INC. (TCR)	1
CASA FERNANDES (TCR)	1
CHARLESTOWN MINI-SUPER, INC. (NO3)	1
CHESTERS INC. (TCR)	1
COUNTRY CHOWDER SHACK (TCR)	1
DAVES KITCHEN 44, INC. (TCR)	1
DLM VARIETY DBA HARMONY CORNER STORE (TCR)	1
DOWNEY WEAVER POST #34 AMERICAN LEGION (TCR)	1
EZ MART #4 (TCR) (GWR)	1
FAMOUS PIZZA (TCR)	1
FEINSTEIN YOUTH CAMP (TCR)	2
FREDRICK J. BENSON TOWN BEACH (TCR)	1
GREENWOOD HILL CAMPGROUND ASSOCIATION (TCR)	5
HICKORY RIDGE CAMPGROUND (TCR)	1
HILLTOP INN (TCR)	1

# TRANSIENT WATER SYSTEMS (CONTINUED)

	NUMBER OF VIOLATIONS
HILLTOP INN (GWR)	1
K & S PIZZA (TCR)	2
MAPLEVILLE MAIN, INC-PLANT 1 (TCR)	1
MAPLEVILLE MAIN, INC-PLANT 2 (TCR)	1
NATIONAL DOMESTIC PREPAREDNESS COALITION (TCR)	1
NEW ENGLAND FARMS (VOC)	1
NEWPORT NATIONAL GOLF CLUB (NO3)	1
NINIGRET INN (TCR)	1
NINIGRET INN (NO3)	1
NORDIC LODGE (TCR)	1
NORTH SCITUATE PUBLIC LIBRARY (TCR)	1
OLD WILCOX TAVERN, INC. (TCR)	1
PHIL & ANNS SUNSET MOTEL, INC. (NO3)	1
THE PINES RESTAURANT (TCR)	1
PULASKI MEMORIAL PAR-PARKING AREA (TCR)	1
PURA VIDA H2O CCRI KNIGHT CAMPUS (TCR)	1
SACHUEST POINT NATL WILDLIFE REFUGE (TCR)	1
SACHUEST POINT NAT'L WILDLIFE REFUGE (GWR)	1
SAKONNET GOLF CLUB (NO3)	1
SAKONNET POINT CLUB (VOC)	1
SALS PIZZA (TCR)	1
SHELTER COVE MARINA, LLC (TCR)	1
SHELTER COVE MARINA, LLC (GWR)	1
STEPPING STONE STABLES, INC. (TCR)	1
THE HOMESTEAD GROUP (NO3)	1
THE HOMESTEAD GROUP (TCR)	3
THE WINDSWEPT INN (TCR)	3
TOWNSMEN CLUB, INC. (TCR)	1
TOWNSMEN CLUB, INC. (GWR)	1
US FISH AND WILDLIFE SERVICE VISITOR CTR (TCR)	1
W. ALTON JONES CAMPUS - URI POOR FARM (TCR)	1
WINDMILL HILL GOLF COURSE, INC (TCR).	2
<b>Public Notification:</b>	
COMMONS LUNCH INC.	1
<b>Treatment Technique</b>	
PURA VIDA H2O CCRI KNIGHT CAMPUS	1
TRANSIENT WATER SYSTEM, SUBTOTAL	146

# APPENDIX II

## Compliance Table

<b>State:</b> Rhode Island <b>Reporting Interval:</b> January 1, 2011 through December 31, 2011								
SDWIS Codes		MCL (mg/l)	MCLs		Treatment Techniques		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations
	<u>Organic Contaminants</u>							
2981	1,1,1-Trichloroethane	0.2	0	0			6	6
2977	1,1-Dichloroethylene	0.007	0	0			6	6
2985	1,1,2-Trichloroethane	.005	0	0			6	6
2378	1,2,4-Trichlorobenzene	.07	0	0			6	6
2931	1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0	0			0	0
2980	1,2-Dichloroethane	0.005	0	0			6	6
2983	1,2-Dichloropropane	0.005	0	0			6	6
2063	2,3,7,8-TCDD (Dioxin)	3x10 <sup>-8</sup>	0	0			0	0
2110	2,4,5-TP	0.05	0	0			1	1
2105	2,4-D	0.07	0	0			1	1
2051	Alachlor	0.002	0	0			1	1

**State:** Rhode Island

**Reporting Interval:** January 1, 2011 through  
December 31, 2011

SDWIS Codes		MCL (mg/l)	MCLs		Treatment Techniques		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations
2050	Atrazine	0.003	0	0			1	1
2990	Benzene	0.005	0	0			6	6
2306	Benzo[a]pyrene	0.0002	0	0			1	1
2046	Carbofuran	0.04	0	0			1	1
2982	Carbon tetrachloride	0.005	0	0			6	6
2959	Chlordane	0.002	0	0			1	1
2380	cis-1,2-Dichloroethylene	0.07	0	0			6	6
2031	Dalapon	0.2	0	0			1	0
2035	Di(2-ethylhexyl)adipate	0.4	0	0			1	0
2039	Di(2-ethylhexyl)phthalate	0.006	0	0			2	2
2964	Dichloromethane	0.005	0	0			6	6
2041	Dinoseb	0.007	0	0			1	1
2032	Diquat	0.02	0	0			1	1
2033	Endothall	0.1	0	0			1	1
2005	Endrin	0.002	0	0			1	1

**State:** Rhode Island

**Reporting Interval:** January 1, 2011 through  
December 31, 2011

SDWIS Codes		MCL (mg/l)	MCLs		Treatment Techniques		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations
2992	Ethylbenzene	0.7	0	0			6	6
2946	Ethylene dibromide	0.00005	0	0			1	1
2034	Glyphosate	0.7	0	0			1	1
2065	Heptachlor	0.0004	0	0			1	1
2067	Heptachlor epoxide	0.0002	0	0			1	1
2274	Hexachlorobenzene	0.001	0	0			1	1
2042	Hexachlorocyclo-pentadiene	0.05	0	0			1	1
2010	Lindane	0.0002	0	0			1	1
2015	Methoxychlor	0.04	0	0			1	1
2989	Monochlorobenzene	0.1	0	0			6	6
2968	o-Dichlorobenzene	0.6	0	0			6	6
2969	para-Dichlorobenzene	0.075	0	0			6	6
2383	Total polychlorinated biphenyls (PCB's)	0.0005	0	0			1	1
2326	Pentachlorophenol	0.001	0	0			1	1
2987	Tetrachloroethylene	0.005	0	0			6	6

**State:** Rhode Island

**Reporting Interval:** January 1, 2011 through  
December 31, 2011

SDWIS Codes		MCL (mg/l)	MCLs		Treatment Techniques		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations
2984	Trichloroethene	0.005	0	0			6	6
2996	Styrene	0.1	0	0			6	6
2991	Toluene	1.0	0	0			6	6
2979	trans-1,2-Dichloroethylene	0.1	0	0			6	6
2955	Xylenes (total)	10	0	0			6	6
2020	Toxaphene	0.003	0	0			1	1
2036	Oxamyl (Vydate)	0.2	0	0			1	1
2040	Picloram	0.5	0	0			1	1
2037	Simazine	0.004	0	0			1	1
2976	Vinyl chloride	0.002	0	0			6	6
	<u>Subtotal</u>		0	0			8 (see notes #2)	8
	<u>Stage 1 Disinfectant Byproducts Rule</u>							
1009	Chlorite	1.0	0	0			0	0
1011	Bromate	0.010	0	0			0	0

**State:** Rhode Island

**Reporting Interval:** January 1, 2011 through  
December 31, 2011

SDWIS Codes		MCL (mg/l)	MCLs		Treatment Techniques		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations
1006	Chloramines	4.0	0	0			0	0
1008	Chlorine Dioxide	0.8	0	0			0	0
0999	Chlorine	4.0	0	0			0	0
2950	Total Trihalomethanes (Section 7.0 systems)	0.08	0	0			0	0
2456	Total Haloacetic Acids	0.06	0	0			0	0
2920	Total Organic Carbon Removal Ratio	1.0			0	0	0	0
	<u>Subtotal</u>		0	0	0	0	0	0
	<u>Inorganic Contaminants</u>							
1074	Antimony	0.006	0	0			0	0
1005	Arsenic	0.05	0	0			0	0
1094	Asbestos (>10 micrometers)	7 million fibers/L	0	0			0	0
1010	Barium	2.0	0	0			0	0
1075	Beryllium	0.004	3	1			0	0

**State:** Rhode Island

**Reporting Interval:** January 1, 2011 through  
December 31, 2011

SDWIS Codes		MCL (mg/l)	MCLs		Treatment Techniques		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations
1015	Cadmium	0.005	0	0			0	0
1020	Chromium	0.1	0	0			0	0
1024	Cyanide (as free cyanide)	0.2	0	0			0	0
1025	Fluoride	4.0	0	0			0	0
1035	Mercury	0.002	0	0			0	0
1040	Nitrate	10	2	2			7	7
1041	Nitrite	1	0	0			0	0
1045	Selenium	0.05	0	0			0	0
SM	Sodium						0	0
1085	Thallium	0.002	0	0			0	0
1038	Total nitrate and nitrite	10 (as Nitrogen)	0	0			0	0
	<b><u>Subtotal</u></b>		2	2			7	7
	<b><u>Radionuclide MCLs</u></b>							
4000	Gross alpha	15 pCi/l	0	0			0	0
4010	Radium-226 and radium-228	5 pCi/l	0	0			0	0

<b>State:</b> Rhode Island <b>Reporting Interval:</b> January 1, 2011 through December 31, 2011								
SDWIS Codes		MCL (mg/l)	MCLs		Treatment Techniques		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations
4101	Gross beta	4 mrem/yr	0	0			0	0
	<u>Subtotal</u>		0	0			0	0

	<u>Total Coliform Rule</u>							
21	Acute MCL violation	Presence	4	4				
22	Non-acute MCL violation	Presence	86	48				
23,25	Major routine Major repeat						55	44
24,26	Minor routine Minor repeat						14	11
34	Groundwater Rule						9	9
75	Public Education						1	1
	<u>Subtotal</u>		90	52			79	65
	<u>Surface Water Treatment Rule</u>							
36	Monitoring, routine/repeat						1	1

**State:** Rhode Island

**Reporting Interval:** January 1, 2011 through

December 31, 2011

SDWIS Codes		MCL (mg/l)	MCLs		Treatment Techniques		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations
41, 43, 44	Treatment techniques				0	0		
	Unfiltered Systems							
31	Monitoring, routine/repeat						1	1
42	Failure to filter				1	1		
	<u>Subtotal</u>				1	1	2	2
	<u>Lead and Copper Rule</u>							
51	Initial lead and copper tap M/R		0	0			0	0
52,56	Follow-up or routine lead and copper tap M/R		0	0			5	5
53	Water Quality Parameters						0	0
57	OCCT/SOWT RECOM./STUDY						2	2
58,62	Treatment Installation				0	0		
65	Public education						0	0
	<u>Subtotal</u>		0	0	0	0	7	7

<b>State:</b> Rhode Island <b>Reporting Interval:</b> January 1, 2011 through December 31, 2011								
SDWIS Codes		MCL (mg/l)	MCLs		Treatment Techniques		Significant Monitoring/Reporting	
			Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations	Number of Violations	Number of Systems With Violations
	<b><u>Consumer Confidence Reports (CCR)</u></b>							
71	CCR Complete failure to report (Major)						3	3
72	CCR Cont1ent Inadequacy (Minor)						0	0
	<b><u>Subtotal</u></b>						3	3
<b><u>Totals</u></b>			93	55	0	0	106	92

Notes:

- 1) Values are in milligrams per liter (mg/l), unless otherwise specified.
- 2) Monitoring violations for Volatile Organic Compounds are issued as a single violation, not as violations for each of the 21 regulated contaminants.

## **Definitions for Appendix (Compliance Table)**

The following definitions apply to Appendix A (Compliance Table) above.

**Filtered Systems:** Water systems that have installed filtration treatment [40 CFR 141, Subpart H].

**Inorganic Contaminants:** Non-carbon-based compounds such as metals, nitrates, and asbestos. These contaminants are naturally-occurring in some water, but can get into water through farming, chemical manufacturing, and other human activities. EPA has established MCLs for 15 inorganic contaminants [40 CFR 141.62].

**Lead and Copper Rule:** This rule established national limits on lead and copper in drinking water [40 CFR 141.80-91]. Lead and copper corrosion pose various health risks when ingested at any level, and can enter drinking water from household pipes and plumbing fixtures. States report violations of the Lead and Copper Rule in the following six categories:

*Initial lead and copper tap M/R:* SDWIS Violation Code 51 indicates that a system did not meet initial lead and copper testing requirements, or failed to report the results of those tests to the State.

*Follow-up or routine lead and copper tap M/R:* SDWIS Violation Code 52 indicates that a system did not meet follow-up or routine lead and copper tap testing requirements, or failed to report the results.

*Treatment installation:* SDWIS Violation Codes 58 AND 62 indicate a failure to install optimal corrosion control treatment system (58) or source water treatment system (62) which would reduce lead and copper levels in water at the tap. [One number is to be reported for the sum of violations in these two categories].

*Public education:* SDWIS Violation Code 65 shows that a system did not provide required public education about reducing or avoiding lead intake from water.

**Maximum Contaminant Level (MCL):** The highest amount of a contaminant that EPA allows in drinking water. MCLs ensure that drinking water does not pose either a short-term or long-term health risk. MCLs are defined in milligrams per liter (parts per million) unless otherwise specified.

**Monitoring:** EPA specifies which water testing methods the water systems must use, and sets schedules for the frequency of testing. A water system that does not follow EPA's schedule or methodology is in violation [40 CFR 141].

States must report monitoring violations that are significant as determined by the EPA Administrator and in consultation with the States. For purposes of this report, significant monitoring violations are major violations and they occur when no samples are taken or no results are reported during a compliance period. A major monitoring violation for the surface water treatment rule occurs when at least 90% of the required samples are not taken or results are not reported during the compliance period.

**Organic Contaminants:** Carbon-based compounds, such as industrial solvents and pesticides. These contaminants generally get into water through runoff from cropland or discharge from factories. EPA has set legal limits on 54 organic contaminants that are to be reported [40 CFR 141.61].

**Radionuclides:** Radioactive particles which can occur naturally in water or result from human activity. EPA has set legal limits on four types of radionuclides: radium-226, radium-228, gross alpha, and beta particle/photon radioactivity [40 CFR 141]. Violations for these contaminants are to be reported using the following three categories:

*Gross alpha:* SDWIS Contaminant Code 4000 for alpha radiation above MCL of 15 picocuries/liter. Gross alpha includes radium-226 but excludes radon and uranium.

*Combined radium-226 and radium-228:* SDWIS Contaminant Code 4010 for combined radiation from these two isotopes above MCL of 5 pCi/L.

*Gross beta:* SDWIS Contaminant Code 4101 for beta particle and photon radioactivity from man-made radionuclides above 4 millirem/year.

**Reporting Interval:** The reporting interval for violations to be included in the PWS Annual Compliance Report, which is to be submitted to EPA by July 1, 2010, is from January 1, 2010 through December 31, 2010.

**SDWIS Code:** Specific numeric codes from the Safe Drinking Water Information System (SDWIS) have been assigned to each violation type included in this report. The violations to be reported include exceeding contaminant MCLs, failure to comply with treatment requirements, and failure to meet monitoring and reporting requirements. Four-digit SDWIS Contaminant Codes have also been included in the chart for specific MCL contaminants.

**SM:** State monitoring requirement for contaminants not regulated under the Safe Drinking Water Act (Sodium)

**Surface Water Treatment Rule:** The Surface Water Treatment Rule establishes criteria under which water systems supplied by surface water sources, or ground water sources under the direct influence of surface water, must filter and disinfect their water [40 CFR 141, Subpart H]. Violations of the “Surface Water Treatment Rule” are to be reported for the following four categories:

*Monitoring, routine/repeat (for filtered systems):* SDWIS Violation Code 36 indicates a system’s failure to carry out required tests, or to report the results of those tests.

*Treatment techniques (for filtered systems):* SDWIS Violation Code 41 shows a system’s failure to properly treat its water.

*Monitoring, routine/repeat (for unfiltered systems):* SDWIS Violation Code 31 indicates a system’s failure to carry out required water tests, or to report the results of those tests.

*Failure to filter (for unfiltered systems):* SDWIS Violation Code 42 shows a system’s failure to properly treat its water. EPA will supply data for this violation code to the States.

**Total Coliform Rule (TCR):** The Total Coliform Rule establishes regulations for microbiological contaminants in drinking water. These contaminants can cause short-term health problems. If no samples are collected during the one-month compliance period, a significant monitoring violation occurs. States are to report four categories of violations:

*Acute MCL violation:* SDWIS Violation Code 21 indicates that the system found fecal coliform or E. coli, potentially harmful bacteria, in its water, thereby violating the rule.

*Non-acute MCL violation:* SDWIS Violation Code 22 indicates that the system found total coliform in samples of its water at a frequency or at a level that violates the rule. For systems collecting fewer than 40 samples per month, more than one positive sample for total coliform is a violation. For systems collecting 40 or more samples per month, more than 5% of the samples positive for total coliform is a violation.

*Major routine and repeat monitoring:* SDWIS Violation Codes 23 and 25 show that a system did not perform any monitoring. (One number is to be reported for the sum of violations in these two categories.)

*Minor routine and repeat monitoring:* SDWIS Violation Codes 24 and 26 show that a system did not did not comply with the required monitoring schedule, by failing to collect the required number of samples. . (One number is to be reported for the sum of violations in these two categories.)

**Treatment Techniques:** A water disinfection process that EPA requires instead of an MCL for contaminants that laboratories cannot adequately measure. Failure to meet other operational and system requirements under the Surface Water Treatment and the Lead and Copper Rules have also been included in this category of violation for purposes of this report.

**Unfiltered Systems:** Water systems that do not need to filter their water before disinfecting it because the source is very clean [40 CFR, Subpart H].

**Violation:** A failure to meet any state or federal drinking water regulation.

# PUBLIC POOLS AND SPAS

## COMPLIANCE DATA

In 2011 HEALTH collected and analyzed a total of approximately 991 samples for bacteria, free residual chlorine, and pH:

Swimming Pool Samples		Therapy Pool Samples	
Indoor	Outdoor	Indoor	Outdoor
477	207	289	18

Of the 991 samples collected the following is a breakdown of the number of violations recorded:

Bacterial Violations				Chlorine Violations			
Swim		Therapy		Swim		Therapy	
Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor
60	25	46	3	81	65	61	7

pH Violations				Temp. violations	
Swim		Therapy		Therapy	
Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor
32	23	54	2	3	0

# BOTTLED WATER

## COMPLIANCE DATA

In 2011 there were 128 out-of-state bottled water companies and four bottled water facilities located in Rhode Island that were issued permits to distribute their products. The four in-state facilities are:

Crystal Spring Water Company	1259 West Main Road	Middletown
Girard Springs	1100 Mineral Spring Ave.	North Providence
Empire Bottling	61 Buttonwood Street	Bristol
Yacht Club Bottling	2239 Mineral Spring Ave.	North Providence

## SAMPLES COLLECTED IN 2010

Raw Water Samples		Product Water Samples		Site Visits
Bacterial	Chemical	Bacterial	Chemical	
1109	6	158	6	108

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